REMARKS

The present invention is directed to a coupling joint assembly of a very lightweight design that can be used in aircraft engines to facilitate a visual, tactile and audible affirmation of a positive sealing connection.

The first coupling member 4 has an axially aligned male coupling portion with a sealing surface, while a second coupling member 6 or female component can be secured to a ferrule tube or compression tube fitting that is welded to a second fluid conduit. The second coupling member can pressure force a complementary bearing surface on the compression tube against a male bearing surface 14 and a supplemental pressed wire or ring 24 can apply a force against the compression tube, as shown in Figure 2.

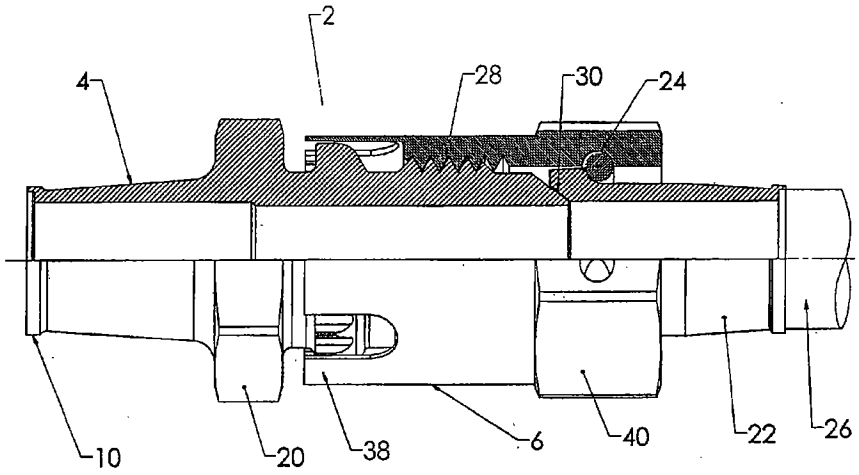


FIGURE 2

As can be seen, the female component member can be integrally formed with a collar member 34 having a plurality of curved cantilevered beams 38 with each of the beams having one or a plurality of radially undulating teeth to mate with serrations 18 on the first male coupling member 4.

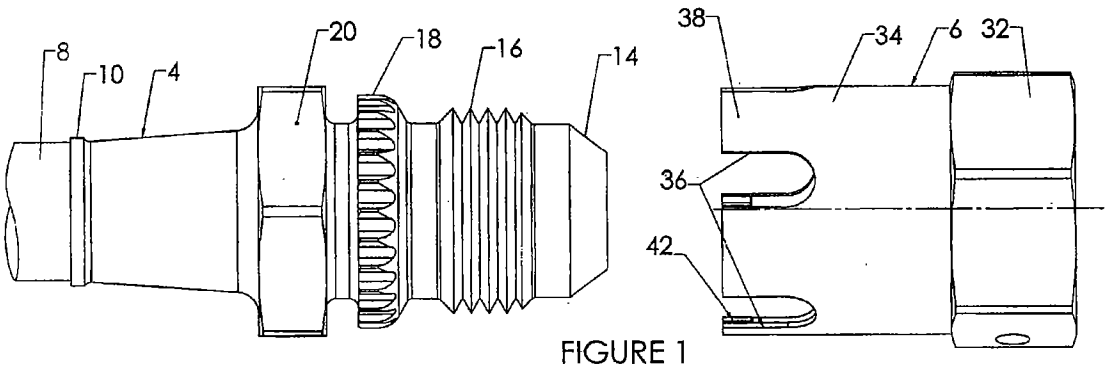


FIGURE 1

[0020] The rotation of the second component member starts the sealing engagement. Only if the threads are preliminarily engaged as the respective sealing surfaces of the first component member and the second component member come into contact and the flexible axial projections on the second component member come into contact with the series of serrations to create both a vibrating tactile and audible indicator for determining that a locking coaction is being engaged and completing the sealing joint. By appropriately determining the number of serrated teeth and the position of the axial projection members will ensure a retention action between the axial projection members and the serrated teeth. (underline added)

There can be a substantial number of fluid connections on an aircraft engine both in the commercial and military field, and a positive coupling action of lightweight couplers with the ability to determine with multiple verifications (sight, sound, feel) of an appropriate sealed connection without requiring extra components including lock wires or other lock means is important.

Our invention, in a highly competitive field, addresses these requirements and provides where appropriate, a visual confirmation of engagement, an audible confirmation of a ratching sound, and a tactile confirmation of vibration to the fingers of the installer.

As can be further appreciated, a number of skilled engineers and scientists work on both commercial and military projects in trying to provide improvements. These factors should be taken into consideration when determining the patentability of our present invention.

> "Thus when differences that may appear technologically minor nonetheless have a practical impact, particularly in a crowded field, the decision-maker must consider the obviousness of the new structure in this light."
>
> *Continental Can Co. USA Inc. v. Monsanto Co.*, 20 U.S.P.Q. 2d. 1746, 1752 (Fed. Cir. 1991).

The Office Action rejected each of the outstanding claims as being completely anticipated by *Peterson et al.* (U.S. Patent No. 5,350,200).

Applicant respectfully traverses this contention:

> "'[T]he dispositive question regarding anticipation is whether one skilled in the art would reasonably understand or infer from the prior art reference's teaching that every claim [limitation] was disclosed in that single reference.' *Dayco Prods., Inc. v. Total Containment, Inc.*, F.3d 1358, 1368 (Fed. Cir. 2003).

The *Peterson et al.* reference is of interest in disclosing a tube coupling assembly where a first tube 12 could be connected to a second tube 14, as shown in Figure 1, by a four component tube coupling assembly 10.

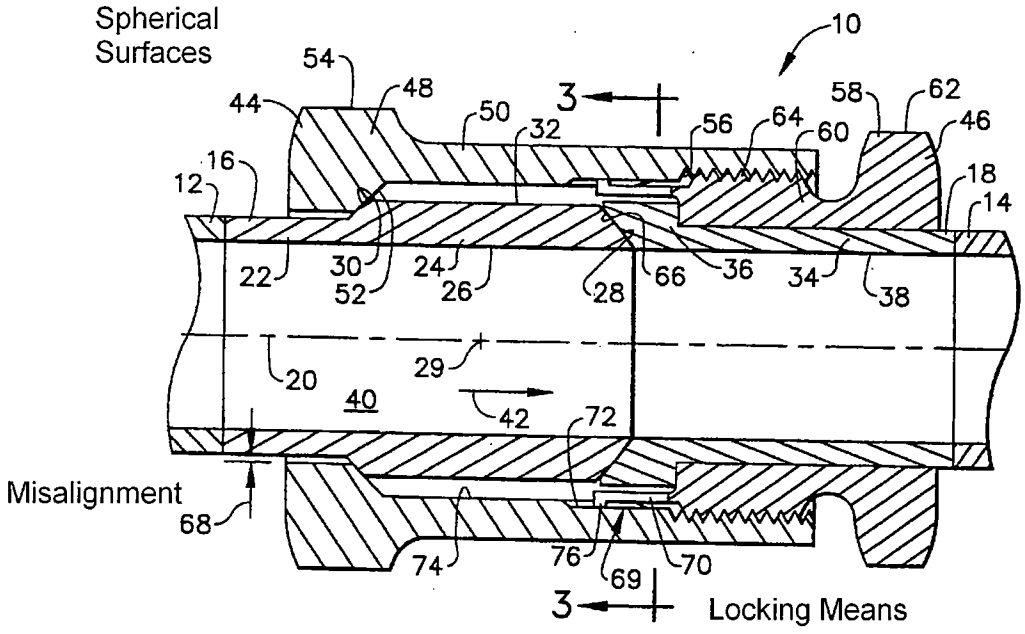
A male sleeve member 16 was butt-welded to a fluid tube 12 and a coupling nut 44 is captured by a second portion 24 of the sleeve member. A coupling nut 44 also had internal teeth 56 formed on its barrel portion. A ferrule 18 was also butt-welded to a fluid tube 14 with an enlarged flared portion 36 on cylindrical portion 34 of the ferrule to serve as a stop for the tube connector 46, with external threads 64 on a barrel portion 60.

Of particular interest is the spherical surfaces 28 and 30 on the sleeve member 16. A frusto-conical surface 66 is designed to interface with the spherical surface 28 while another

frusto-conical surface 52 was formed on the flange portion 48 for contacting the spherical surface 30. The interaction between these specific surfaces enable a misalignment of the respective sleeve 14 and the ferrule 18 and is a principal teaching of this reference to a person of ordinary skill in this field.

The advantage of adjusting for misalignments between two tubes, permits a relative traverse misalignment movement, as shown by the Arrow 68 on Figure 2 and further described in Column 4, Line 56 through Column 5, Line 9.

Peterson et al.
Four Component Coupling



Another feature of interest to a person of ordinary skill in this field is a use of an internal locking means 69 to address the problem of potential handling and operational damages from the

exterior that purportedly existed in the prior art. See Column 1, Line 65 through Column 2, Line 11.

A person of ordinary skill in the field would recognize from a full teaching in this reference that this is a purported solution to prior art B-nut assemblies using safety wires and external locking features to avoid the use of such safety wires. See Column 2, Lines 12-16.

> A prior art reference must be considered in its entirety, i.e., as a whole, including portions that would be lead away from the claimed invention. *W.L. Gore & Associates, Inc. v. Garlock, Inc.*, 721 F.2d 1540, 220 USPQ 303 (Fed. Cir. 1983), *cert. denied*, 469 U.S. 851 (1984).
>
> MPEP 2141.02 VI

The Office Action referred to the tube connector 46 as being equivalent to the second member of our Claim 1 in purportedly having a plurality of annularly spaced axial cantilevered beams 70 having at least one tooth to engage serrations.

The Office Action further asserted and Applicant specifically traverses, an unsupported assertion that the fingers 70 with a tip portion 76 and their engagement with the grooves 72 would teach the following contention of Page 3 of the Office Action:

> an operative engagement of the tooth and serrations enables a relative low force rotation during a sealing engagement of the first sealing surface and the second sealing surface and a relatively higher force resistance to rotation during disengagement the axially spaced cantilevered beams are spaced to position respective distal ends of the cantilevered beams to enable a visual conformation of engagement of an alignment of a tooth and annular serrations between the spacing of the cantilevered beams. (underline added)

The Figure 1 of *Peterson et al.* clearly discloses that the respective distal ends of the fingers are purposely positioned to prevent any external contact and would block a visual confirmation of engagement of a tooth (tip portion) and serrations (grooves) between the spacing of the cantilevered beams (fingers) by an installer.

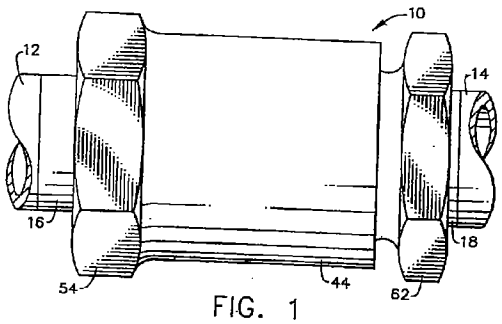


FIG. 1

In fact, the tip portion 76 of the fingers 70 as seen in the cross section of Figure 3, are positioned so that the tip portions are not specifically engaged with the grooves and in fact, only a few of the fingers may engage with the grooves, as described in Column 5, Lines 51-62.

> Each of the fingers 70 includes a radially outwardly extending tip portion 76. Fingers 70 and grooves 72 are disposed axially and radially relative to one another so that at least one of the tip portions 76 is positioned within one of grooves 72 as illustrated by the relative position of finger 70A and groove 72A in FIG. 3 so that finger 70a and groove 72A are releasably interlocked. Others of fingers 70 may be partially engaged with one of the grooves 72, as illustrated by finger 70B, while still others of fingers 70 may not be engaged with any of the grooves 72, as illustrated by finger 70C in FIG. 3.

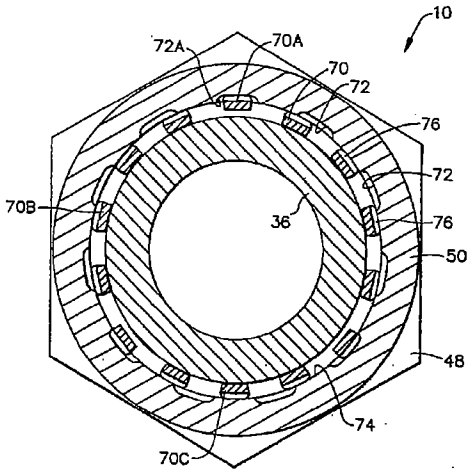


FIG. 3

By reviewing Figure 3, it can be seen that apparently groove 72A and tooth 70A are designed for engagement while the rest of the teeth apparently are under a minor degree of compression from contact with the majority of the land portions between the grooves of the radial inner surface 74 of the barrel portion 50 of the coupling nut 44. This arrangement of only a few fingers being interconnected may be of assistance in enabling a minor misalignment between the axis of the respective coupling members. It does not, however, provide audible, tactile and visual features of our present invention, nor does it teach any configuration of a cantilevered beam of a curvilinear cross section traverse to the axial direction with multiple teeth.

Needless to say, it also does not enable a cantilevered beam with a plurality of teeth, or at least a pair of teeth provided on axial distal side ends of each cantilevered beam. These features are set forth in our dependent Claims 2 and 3, respectively.

Additionally, there is no teaching of the following feature of different resistance forces between the teeth of our cantilevered beams in the design of our teeth as shown and supported, for example, in Figure 3 of our invention, as follows:

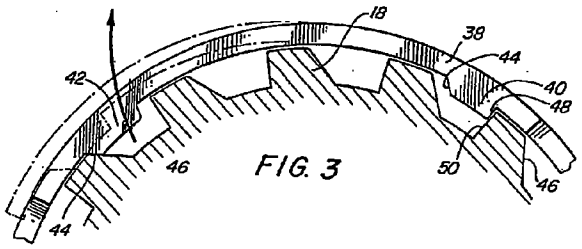


FIG. 3

This feature of Claim 1 can be seen by the respective teeth faces 44 and 48 in Figure 3..

These features are set forth in Claim 1 as follows:

> an operative engagement of the tooth and serrations enables a relative low force rotation during a sealing engagement of the first sealing surface and the second sealing surface and a relatively higher force resistance to rotation during disengagement.

As can be appreciated, our serrations or indents in our first member can be configured with a sloping camming surface 46 that can engage a corresponding sloping surface 44 on the cantilevered beam teeth to enable a relatively low force rotation during the sealing engagement while the rear surfaces 50 and the serrations 18 and 48 on the cantilevered tooth 40 can provide relatively higher force resistance during disengagement.

Our dependent claims, such as dependent Claim 4, adds additional features such as the cantilevered beams having inner and outer diameters that subscribe concentric circles and, accordingly, provide a stronger retention feature by resisting bending.

Dependent Claim 5 further defines a pair of spaced teeth projecting radially inward from each cantilevered beam, which is not suggested by *Peterson et al.*

Claim 6 defines truncated teeth with tapered surfaces of different angular dimensions which is not suggested by *Peterson et al.*

Claim 8 defines three spaced teeth projecting radially inward from each cantilevered beam, while Claim 9 defines chamfered axial leading surfaces for the series of serrations.

Claim 11 defines a plurality of teeth on each beam with the initial and final operative engagement contacting of the teeth and serrations being directly between the entrance of the teeth in the axially aligned surfaces of the serrations.

Newly drafted Claim 19 defines the advantages of having only an integral two piece coupling assembly that can be appropriately connected to respectively a first fluid conduit and a second fluid conduit. The position of the series of serrations in a circular pattern on the first

member are operatively designed to engage a series of teeth on arc shape cantilevered beams that can be appropriately cut from a hollow cylinder with spacing positioned between the beams to enable a visual confirmation at many installations on an aircraft engine to provide a further assurance of a sealing engagement.

The plurality of teeth extend radially inward to engage the radially outward series of serrations, thereby providing not only a visual confirmation of an engagement contact of the teeth and serrations between the spacing of the cantilevered beams, but further providing an audio and tactile confirmation of engagement of the teeth and serrations as the plurality of teeth ratchet over the circular pattern of serrations.

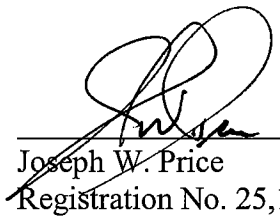
The *Peterson et al.* reference does not teach an integral two piece fluid coupling assembly nor does it provide features defined in newly drafted Claim 19 and its dependent Claim 20.

In view of the above comments, it is believed the original Claims 1-18 are allowable over the cited reference and that newly drafted Claims 19 and 20 provide an alternative definition of the present invention which more than adequately distinguishes over the references of record.

If the Examiner believes a telephone conference will assist in the prosecution of this matter, the undersigned attorney can be contacted at the listed phone number.

Very truly yours,

SNELL & WILMER L.L.P.



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